

REMARKS

Applicants thank Examiner Keys for conducting the kind and courteous interview with Applicants' representative on August 13, 2004. The substance of the discussion is reflected in the amendments to the specification and claims and the comments contained herewith.

Claims 1-10 are pending. Claims 1-4, 6-7, and 9 are amended. Claim 8 is canceled without prejudice. Since Claims 9 and 10 have been withdrawn from consideration, upon entry of the amendment, Claims 1-7 will be active for the Examiner's consideration. The amendments to the claims serve to improve readability; wherein support is found in the original claims as filed. It is believed that no new matter will be added upon entry of the amendment.

An aspect of the present invention is directed to a process which comprises alkoxyating a monool with at least one alkoxyating agent to obtain a polyoxyalkylene alcohol in the presence of a catalyst which comprises a metallo-organic framework material of metal ions and at least bidentate coordinately bound organic ligands.

The rejection of Claims 1-8 under 35 U.S.C. § 102(a) over Muller et al. (U.S. 2003/0078311 A1) is respectfully traversed.

Muller describes "an integrated process for a preparation of a polyurethane comprising at least the following steps: (2) reacting **at least one organic compound**, which is capable of being alkoxyated, with **at least one alkoxyating agent**" (see p. 1, [0011]-[0012]; emphasis added herein). Muller states that the organic compound is one that is capable of being alkoxyated, but Muller's possible choices of organic compounds does not include a monool.

This is in contrast to that which is claimed herein. That is, Muller does not describe a process which comprises alkoxyating a monool with at least one alkoxyating agent to obtain

a polyoxyalkylene alcohol in the presence of a catalyst which comprises a metallo-organic framework material of metal ions and at least bidentate coordinately bound organic ligands.

Accordingly, it is requested that the Examiner withdraw this rejection.

As noted in the August 13, 2004 discussion, Muller provides a broad suggestion by stating that [0066]: "in principle all organic compounds, which can be alkoxyated" may be employed within the context of Muller's invention. This broad suggestion is brought into focus upon inspection of Muller's listing that contains at least 60 different general and specific organic compounds, which can be alkoxyated. In this listing, which includes several molecules that contain hydroxyl groups (e.g., *N*-ethyl-ethanolamine, diols, and polyols) there is no suggestion that a monool falls within the realm of organic compounds that are capable of being alkoxyated. It is kindly requested that the Examiner consider the fact that Muller provides a comprehensive listing of most all organic *O*-nucleophiles, such as mono- or dicarboxylic acids, amino alcohols, diols, and polyols. Muller even includes *water* within his listing. One of ordinary skill would recognize that this listing represents a majority of common organic *O*-nucleophiles that are capable of being alkoxyated. Yet, interestingly, Muller does not include a monool. In view of the explicit omission of a monool from this listing, it is kindly requested that the Examiner view this as a teaching away and that Muller's disclosure does not render the claimed invention obvious. Consequently, it is requested that the Examiner withdraw this rejection.

The rejection of Claims 1-5 under 35 U.S.C. § 102(a) over Mueller et al. (DE 1011230; see U.S. equivalent US 2004/0097724 A1) is respectfully traversed.

Mueller describes an alkoxyating process which entails adding an alkoxide unit ( $R^1O-$ ), which is obtained from an alcohol ( $R^1OH$ ), to an acetylene or allene (see formula IV or V; [0032]) to obtain an alkoxy-ene compound (formula I) or a geminal-bis(alkoxy) hydrocarbon (formula II).

Mueller does not describe a process which comprises alkoxylating a monool with at least one alkoxylating agent to obtain a polyoxyalkylene alcohol in the presence of a catalyst which comprises a metallo-organic framework material of metal ions and at least bidentate coordinately bound organic ligands.

Accordingly, it is requested that the Examiner withdraw this rejection.

It is true that Mueller describes a general procedure for the preparation of metallo-organic frameworks (MOFs) and their potential catalytic applications (see paragraphs [0019]-[0024] and [0027]-[0028]). Amongst the 31 general and specific reaction types, Mueller suggests *alkoxylation*. However, in the context of Mueller's disclosure, alkoxylation is related to the addition of alcohols onto acetylenes or allenes (see [0031]-[0032]). Within the framework of Mueller's disclosure, the alkoxylating agent is the alcohol (or monool). This is in contrast to that which is claimed in Claim 1 in which the monool and alkoxylating agent are different entities. Accordingly, it is believed that Mueller's disclosure is incapable of sufficiently supporting a prima facie case of obviousness. It is kindly requested that the Examiner consider the same.

The rejection of Claim 8 under 35 U.S.C. § 102(b) as being anticipated by Hamilton (US 3,338,467) is obviated by amendment.

Upon entry of the amendment, Claim 8 will no longer be active.

Accordingly, it is requested that the Examiner withdraw this rejection.

The rejection of Claims 1, and 6-8 under 35 U.S.C. § 103(a) as being unpatentable over Mueller et al. in view of Hamilton is respectfully traversed.

Mueller describes reactions that may occur in MOF cavities, but does not describe or suggest to react a monool with an alkoxylating agent using an MOF as a catalyst. Hamilton describes reacting a monool with an alkoxylating agent in an aluminosilicate cavity, but Hamilton accomplishes this feat using cavities that are markedly specialized under optimized

conditions. Mueller does not state that the reaction may occur in any cavity, rather, Mueller states that certain reactions may occur in certain aluminosilicate cavities (col. 1, *ll.* 24-24). Given this fact, it is difficult to envision why Hamilton's process, which is optimized using an aluminosilicate material, would be capable of occurring using Mueller's material. Applicants respectfully request that the Examiner recognize the that union of Mueller and Hamilton should be broken in as much as Hamilton's disclosed process would not lead one of ordinary skill to employ Mueller's MOFs as a catalyst for a alkoxylation involving a monool and an alkoxyating agent.

As noted above, Mueller does not disclose the invention as claimed herein. Mueller describes alkoxyating alkenes and allenes by adding an alkoxyl substituent, obtained from an alcohol, to one of these two organic compounds. In the context of Mueller's disclosure, the alcohol is the alkoxyating agent and the acetylene/allene is the compound that is capable of being alkoxyated. Mueller's acetylenes/allenes are not alkoxyating agents. Furthermore, there is no suggestion or motivation to one of ordinary skill in the art that a monool would be capable of reacting with at least one alkoxyating agent to form a polyoxyalkylene alcohol. It may be true that Mueller describes MOFs, but there is no specific or general suggestion that a monool can be alkoxyated using an alkoxyating agent in the presence of the MOFs.

Hamilton's disclosure, on the other hand, does describe the reaction of a monool with an alkoxyating agent (col. 2, *l.* 15-20 and col. 1, *ll.* 60-65). However, Hamilton's alkoxyating reaction (or process) occurred "in the presence of an aluminosilicate having unique catalytic activity" (col. 1, *ll.* 7-11). In the context of Hamilton's disclosure, aluminosilicates are either naturally occurring or synthetic aluminosilicates (col. 3, *ll.* 24-34). Hamilton's catalyst having unique catalytic activity stems from the inherent structure of the aluminosilicate and the arrangement of cationic sites therein (col. 1, *ll.* 13-24 and col. 1, *ll.* 40-57). Hamilton does not suggest that an alkoxyating reaction with a monool and an

alkoxylating agent would be capable of occurring in an MOF. The reason for this lack of suggestion is that MOFs were only very recently discovered. In fact, the only true commonality between Hamilton's aluminosilicate compounds and Applicants' MOFs is that both materials contain pores. Inspection of Hamilton's disclosure, shows that the pore size of the aluminosilicates is generally much smaller than that of the MOFs described herein (see col. 4, *ll.* 35-41). Beyond this point of commonality, Hamilton's aluminosilicate compounds and Applicants' MOFs diverge substantially. For example, Hamilton's pores are primarily if not exclusively composed of an oxyanion environment. This it to be contrasted with Applicants' pore constituency in which the presence of the organic ligand imparts to a pore the varying degree of hydrophobicity. This degree of hydrophobic variability is simply not possible for Hamilton's oxy-anion-laden porous material. A comparison of Hamilton's aluminosilicate pores and Applicants' MOF pores would lead one to infer that the pores are going to have different affinities for organic substrates. Therefore, a reaction process that is shown to be proven in one class of compounds (i.e., Hamilton's aluminosilicate framework), may not be effective for a MOF. Accordingly, herein resides a basis for patentability of the claimed invention over the combination of Hamilton's and Mueller's disclosure. It is kindly requested that the Examiner deem that the claimed invention is unobvious in view of these two disclosures and withdraw this rejection.

The rejection of Claims 1-8 under 35 U.S.C. § 103(a) as being unpatentable over Hamilton in view of Yaghi (U.S. 5,608,508).

As noted above, Hamilton does not describe, suggest or motivate one of ordinary skill in the art that a monool could undergo reaction with an alkoxylating agent using a metallo-organic framework as a catalyst. Using the same kinds of reasoning outlined above, it is believed that the combination of Hamilton's and Yaghi's disclosure is improper.

Yaghi's disclosure describes the preparation and physical properties of a few selected MOFs. Yaghi describes the structural characteristics of these compounds and notes their apparent pore sizes. In fact, his discovery of these compounds and their microporous behavior leads him to suggest that these materials may be employed in catalysis (col. 3, *ll.* 60-67). Yaghi does not suggest that a monool may react with an alkoxylating agent in the presence of the metal organic framework. Yaghi's motivation for producing MOFs appears to stem from the fact that it is synthetically very challenging to prepare aluminosilicate materials in which the cavity size has a varying degree of three-dimensional geometry and size (see col. 1, *ll.* 24-57). It would appear that Yaghi discovered MOFs with the intent not to replace aluminosilicate materials, but rather to complement them. If Yaghi's MOFs were meant to replace aluminosilicate materials, then MOFs would have properties akin to those of the aluminosilicates; which would lend credence to the notion that processes that work well with aluminosilicates would work well with MOFs. However, MOFs and aluminosilicates are fundamentally different. Given that the two materials are fundamentally different, it may be true that what works well with one material may not work well with the other. Accordingly, upon inspection of Hamilton's disclosure it is believed that it is impossible to predict whether or not a monool would be capable of reacting with an alkoxylating agent using an MOF as a catalyst. Consequently, it is believed that this degree of unpredictability may be translated into a degree of uncertainty such that the claimed invention is unobvious when viewed in light of the combined disclosures. Accordingly, it is kindly requested that the Examiner acknowledge the same, and withdraw this rejection.

The Examiner's objection to the specification as containing essential subject matter that is contained exclusively in a foreign patent or application publication is respectfully traversed. Applicants' specification contains a reference to Yaghi's patent (U.S. 5,648,508),

which describes to one of ordinary skill how to prepare MOFs. It is kindly requested that the Examiner withdraw this objection.

Applicants thank the Examiner for detecting the misspelling on page 2 of the specification.

The specification has been amended in order to correct this typographic error. It is believed there are no additional typographical errors. However, should the Examiner detect any additional errors it is kindly requested that the Examiner bring this to the Applicants' attention so that these errors may be corrected.

It is believed that the application is in condition for allowance. Should the Examiner deem that a personal or telephonic interview would be helpful in advancing this application toward allowance, he or she is encouraged to contact Applicant's undersigned representative at the below-listed telephone number.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read "Daniel R. Evans", is written over a horizontal line.

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